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This study provides empirical validation for Roe's system of classification of occupations by comparing descriptions within that system with descriptions given by immediate supervisors through the Minnesota Job Description Questionnaire (MJDQ). The MJDQ yields Occupational Reinforcer Pattern (ORP) depicting relative magnitudes of 21 reinforcers for each of the 81 occupations surveyed. One-way analysis of variance tested the hypothesis that different mean ORP values would be found for occupations grouped at the six different levels of Roe's classification. Statistically significant differences were found on 15 ORP variables within four levels. Workers at higher levels scored higher in Responsibility, Creativity, Antonomy, Authority, as well as in Achievement, Ability, Utilization, Social Status, and lower in Supervision-Technical. More reinforcers were found to be available to higher level occupations, and these reinforcers were primarily intrinsic. Extrinsic reinforcers showed no significant differences between levels. (BP)

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Supervisor Perceptions of Occupational Environments and Roe's Classification of Occupations[1]

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The complexity of the occupational world, with some 22,000 different occupations listed in the 1965 Dictionary of Occupational Titles (U. S. Department of Labor, 1965), requires that thinking about occupations be guided by a conceptual framework which summarizes the important differences and similarities among occupations. Because of this complexity, a taxonomy of occupations can make a significant contribution to the work of both the counselor and the research worker. A variety of proposals have been suggested which might be considered occupational taxonomies; notable among these are the work of Roe (1956), Super (1957), Holland (1966), Ghiselli (1966), and the work by the U. S. Department of Labor in developing a manual of Worker Trait Requirements for 4,000 Jobs (1956) and the Dictionary of Occupational Titles (1965). All of these approaches have in common a concern with classifying occupations on psychologically meaningful dimensions. Each system has been based on a foundation of empirical data, but the final form of each is also dependent on the logical or theoretical preferences of their creators.

Other investigators have attempted to build occupational families with psychological relevance, but have relied almost solely on the empirical relations among data in a particular domain, and have minimized the role of rational or theoretical

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decisions in making the classification scheme. Occupational families based predominantly on empirical data have been derived from vocational interest measurement data (Strong, 1943; Norman, 1960; and Holland, Krause, Nixon, and Tremblath, 1953), and from data on the ability requirements of occupations (Orr, 1960; Ghiselli, 1966).

With the variety of classification schemes available, the counselor or research worker must select from among the several taxonomies the one which appears to have most utility for his work. To make this selection wisely he needs to know something about the validity of the various alternatives. Typically, these taxonomies have been advocated because of their utility, simplicity, or conceptual clarity; only rarely have these taxonomies been evaluated with respect to some external, empirical criteria. The present paper makes such an independent evaluation of one of the earliest and best known of these taxonomies, namely Roe's (1956) system for the classification of occupations.

In Roe's (1956) classic study, she extensively reviewed the available literature and proposed to classify occupations on two dimensions, by group and by level. She classified occupations into eight groups defined by primary focus of activity. The specific groups, which appear to be divided primarily on differences in vocational interests, are 1) Service, 2) Business Contact, 3) Organization, 4) Technology, 5) Outdoor, 6) Science, 7) General Culture, and 8) Arts and Entertainment. Occupations are also placed into one of six levels, depending on such factors

as the level of skill required and the level of autonomy, authority, and responsibility associated with the occupation. A specific occupation can be placed in one of forty-eight possible cells defined by the intersection of the eight groups and six levels.

Roe's purpose in constructing the system was to have a workable framework in which to study occupational choice, particularly in relation to personality differences. Applications of Roe's system in counseling and research have attested to its utility as a classification scheme. In one of its earliest research applications, it was successfully used by Super (1955) in his Career Pattern Studies to measure consistency of occupational choice. In a recent application, Lunneborg and Lunneborg (1968) have found occupational data coded in Roe's classifications useful for predicting college academic achievement. Super (1957) endorses the conceptual value of Roe's system for the practicing counselor, although he has expanded the classification by a third dimension covering enterprise.

In a direct study of the validity of the classification system, Roe and her associates (Roe, Hubbard, Hutchinson, & Bateman, 1966; Hutchinson and Roe, 1968) found evidence for the validity of the classification into eight groups. However, no direct tests seem to have been made of the validity of the other dimension of Roe's system, the classification of occupations into six levels. Therefore, the present paper attempts to extend understanding of Roe's system by examining the validity of the level classification.

Roe (1956, p. 149) explains that her level "classification is based upon degrees of responsibility, capacity, and skill."

She further states: "It should be noted that these are not exactly correlated. Whenever there are marked differences, level of responsibility is considered primary. By level of responsibility is meant not only the number and difficulty of decisions to be made, but also how many different kinds of problems must be decided." These comments make it clear that Roe's level dimension is neither simple nor undimensional. Since she has attempted to make the level dimension a composite of many of the trends found in previous empirical studies, it is reasonable to expect the level classification to be related to several different attributes of occupations.

A direct way to examine the validity of the Roe level classification is to obtain information about specific occupations on the kinds of dimensions which are seen as defining Roe's classification of level. Data which permit a direct test of the relationship between Roe's designation of occupational level and several empirically measured characteristics of occupations have been obtained in a recent study by Borgen, Weiss, Tinsley, Dawis, and Lofquist (1968a, 1968b). That study was concerned with differentiating a variety of occupations in terms of their capacity to provide workers with different kinds of occupational reinforcement, reward, or satisfactions.

Method

Instrumentation

The study by Borgen *et al.* (1968a, 1968b) was an attempt to directly measure occupational environments with respect to their psychological characteristics. Specifically, the goal was to measure the differential capacity of occupations to provide workers

reinforcement or reward for various intrapersonal needs, such as needs for variety, recognition, and achievement. The Minnesota Job Description Questionnaire (MJDQ) was developed to assess the differential reward characteristics of occupations.

The MJDQ is a multiple rank orders variation of the general pair comparison method, with neutral point, following the work of Gulliksen (1964). In this instrument the 21 statements shown in Table 1 are rated with respect to how well they describe reinforcement conditions for a given occupation. For descriptive economy, each statement in Table 1 has been assigned a scale name, representing the major content of the item. If interpreted too broadly, these scale names may be misleading. It should be noted that the content of each of the 21 dimensions is restricted to a single item; therefore the psychological content attributed to the scale name also must be appropriately restricted. Thus, for example, Authority in the context of this research means "telling other <u>workers</u> what to do," rather than some more generalized construct of authority.

In the multiple rank orders design of the MJDQ, the different statements are presented in 21 ranking groups, each containing five statements, so that each statement is ranked only once with each of the other statements. The respondent rates the statements in each group from 1 to 5, giving a "1" to the characteristic "most descriptive" of the job environment he is rating, and a "5" to the "least descriptive" characteristic.

These rankings provide information about the relative level of reinforcers in the occupation; additional information about the absolute level of the reinforcers is obtained from a section of the MJDQ where each of the 21 statements is judged categorically with respect to whether it "describes" or "does not describe" a given occupation. These categorical responses permit the derivation of a "neutral point" (Gulliksen, 1964) such that reinforcer statements rated above the neutral point can be thought of as present in the environment and reinforcers below the neutral point are not present.

Scaling of the MJDQ for a given group of raters produces an Occupational Reinforcer Pattern (ORP) for the occupation being rated. The ORP provides a description of the estimated magnitude of each of the 21 reinforcers for the occupation.

Data collection

Immediate supervisors of occupations were selected as the appropriate raters of occupational reinforcers because 1) they presumably have thorough knowledge of the occupation derived from their observation of several workers, and 2) because their perceptions, unlike those of job incumbents, were assumed less likely to be distorted by their personal needs and job satisfaction. Responses to the MJDQ were received, by mail, from 2,976 immediate supervisors of workers in 81 different occupations and several hundred different firms. (A more detailed discussion of the collection of ORP data is presented by Borgen et al., 1968a.) These occupations, which were both professional and nonprofessional, were selected to be representative of the range of occupations in

the 1965 Dictionary of Occupational Titles and the occupations covered by the available Occupational Aptitude Patterns (U. S. Department of Labor, 1966). The coverage also emphasized occupations in which relatively large numbers of persons are employed. Since the ORP ratings were obtained from supervisors, coverage of occupations at the uppermost levels of the occupational structure was somewhat restricted. The number of MJDQs received for each occupation ranged from 22 to 95. The 81 occupations for which ORP data were collected are shown in Table 2, according to the level designated for each in Roe's system.

Analysis

For each occupation, pair comparison scale values were derived for the 21 reinforcement dimensions and the neutral point, using the approximation method devised by Guilford (1954, pp. 169-170). The measurement units for the scale values thus derived are essentially arbitrary. Consequently, adjusted scale values were obtained for each occupation by subtracting the scale value for the neutral point from each of the original scale values; thus, the adjusted neutral point became 0.0 and reinforcers with positive adjusted scale values can be thought of as present in the occupation, and those with negative adjusted scale values presumably are absent. Furthermore, this adjustment for the absolute level of reinforcers makes comparisons of reinforcer strength across occupations considerably more meaningful.

The 81 occupations for which ORP data were available were classified into one of the six levels of Roe's classification. Using Roe's (1956) enumeration of occupations and an amplified coding guide used by Lunneborg and Lunneborg (1968), two graduate

students in psychology coded the 81 occupations. By coding only occupations which were specifically mentioned in the coding schemes, agreement was obtained on the level designation for nearly all occupations. Three occupations--technical publications writer, vocational school instructor, and stationary engineer--could not be readily identified in the classification lists; consequently, the following results are based on the 78 occupations for which the level coding was relatively unequivocal, with coding as shown in Table 2. None of the occupations were coded in level 1, indicating that the necessity of selecting occupations with readily identifiable supervisors had restricted the range of occupations in the sample.

One-way analysis of variance was used to test the hypothesis that different mean ORP scale values, on each of the twenty-two dimensions, would be found for occupations grouped at different levels in Roe's classification. Thus, twenty-two one-way analyses of variance were run, with the levels of the independent variable being the coding of Roe's level, and the dependent variables being successively the 22 scales of the ORPs. (The dependent variable for the neutral point, which represents the number of reinforcers perceived in the environment, was necessarily the unadjusted neutral point, since the adjusted neutral points were, by definition, zero for all occupations.) Because only one occupation was placed in Roe's level 6, levels 5 and 6 were combined for these analyses.

Results

The results for all twenty-two of the ORP dimensions are shown in Table 3, which shows the mean scale value for each of

Roe's level code groups, the F-statistics and probabilities for each of the one-way ANOVAs, and an index of strength of association, omega-squared. Omega-squared (Hays, 1963) lends interpretability to the results, since it can be used as an index of the proportion of variance accounted for, or in this case, the proportion of the variability in the ORP scale values which is associated with Roe's level designation.

Table 3 shows that statistically significant differences ($p \leq .05$) were obtained for fifteen of the twenty-two ORP scales. Omega-squared values for these 15 scales ranged from .54 for Responsibility to .07 for Independence. In addition to the Responsibility scale, relatively high omega-squared values were also obtained for Autonomy (.53), Creativity (.43), Ability Utilization (.41) and Achievement (.34). The unadjusted Neutral Point also yielded a relatively high omega-squared value of .48. Significant differences among Roe's levels were also obtained on the following ORP scales: Advancement, Authority, Independence, Moral Values, Recognition, Social Service, Social Status, Supervision-Technical and Variety.

Examination of the group means presented in Table 3 shows essentially linear trends for twelve of the fifteen ORP scales on which significant differences were obtained among the four levels of Roe's classification system. For ten of these 12 scales, level 2 had the highest mean scale value. These scales included the five scales with the highest omega-squared values (excluding the neutral point), namely Responsibility, Autonomy, Creativity, Ability Utilization, and Achievement. Variables specifically

hypothesized to underly Roe's level classification also showed linear mean differences. Mean scale values for these variables (Responsibility, Creativity, Autonomy and Authority) are shown in Figure 1.

For two of the twelve ORP scales with linear trends in means, levels 5 and 6 had the highest mean scale values. These scales were Supervision-Technical and the unadjusted Neutral Point. On the remaining three scales (Advancement, Independence and Recognition) highest mean scale values were observed for level 3. On 13 of the 15 significant ORP scales, groups 5 and 6 had the lowest mean scale values; the exceptions were the two scales on which those levels were highest.

Conclusions

The results of this study provide empirical confirmation for several of the dimensions which Roe (1956) postulates as underlying her classification of occupational level. Specifically, these results imply that in higher level occupations in Roe's system, workers are more likely to "make decisions on their own" (Responsibility), "try out their own ideas" (Creativity), "plan their work with little supervision" (Autonomy), and, to a lesser degree, "tell other workers what to do" (Authority). In addition to these specific expectations derived from Roe's system, the results indicated several other dimensions of reinforcement which are significantly related to Roe's occupational level. Workers at higher Roe levels appear to be more likely to "get a feeling of accomplishment" (Achievement), "make use of their individual abilities" (Ability Utilization), "have the position of 'somebody'

in the community" (Social Status), and less likely to "have bosses who train their men well" (Supervision-Technical).

Moreover, it was found that Roe's level was substantially related, with an omega-squared value of .48, to the neutral point on the scaling of the ORPs. For these data the neutral point is equivalent to the average number of reinforcers perceived as salient in the occupational environment. Thus, an unexpected, but provocative, outcome of this study is the suggestion that the number of occupational rewards available to workers is related to the level of their occupation. These results are provocative because they appear to provide a theoretical explanation for what Paterson (1957) discusses as the occupational hierarchy of job satisfaction. Several studies (e.g., Paterson & Stone, 1942) have found that the proportion of satisfied workers in occupations increases with increases in occupational level. The present results suggest a factual basis for this satisfaction hierarchy, namely that occupations at higher levels are more likely to provide satisfaction simply because there are a greater number of reinforcers present in higher level occupations.

The results of this study provide independent confirmation of some of the variables that Roe hypothesized as the basis for her level classification. It is interesting to note that all of the reinforcers for which differences were not significant (Advancement, Company Policies, Compensation, Co-workers, Security, Supervision-Human Relations and Working Conditions) were extrinsic reinforcers. This finding suggests that Roe's level classification reflects occupational differences primarily among intrinsic reinforcers.

In addition to supporting the construct validity of Roe's classification system, and explicating the variables underlying that system, these results also support the construct validity of the Minnesota Job Description Questionnaire as a measure of Occupational Reinforcer Patterns, since the obtained results are consistent with theoretical expectations derivable from a theory of occupational reinforcers (Dawis, England and Lofquist, 1964; Dawis, England and Weiss, 1968) as well as from Roe's theory of occupational structure.

Table 1

Scale names and items in Minnesota
Job Description Questionnaire

	Scale	Item
1.	Ability utilization	make use of their individual abilities
2.	Achievement	get a feeling of accomplishment
3.	Activity	are busy all the time
4.	Advancement	have opportunities for advancement
5.	Authority	tell other workers what to do
6.	Company policies and practices	have a company which administers its policies fairly
7.	Compensation	are paid well in comparison with with other workers
8.	Co-workers	have co-workers who are easy to make friends with
9.	Creativity	try out their own ideas
10.	Independence	do their work alone
11.	Moral values	do work without feeling that it is morally wrong
12.	Recognition	receive recognition for the work they do
13.	Responsibility	make decisions on their own
14.	Security	have steady employment
15.	Social service	have work where they do things for other people

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Table 1, cont.

Scale	Item
16. Social status	have the position of "somebody" in the community
17. Supervision-human relations	have bosses who back up their men (with top management)
18. Supervision-technical	have bosses who train their men well
19. Variety	have something different to do every day
20. Working conditions	have good working conditions
21. Autonomy	plan their work with little supervision

Table 2

81 ORP Occupations Grouped by Roe's Level

Level 2 (N=11)

Caseworker
Counselor, School
Counselor, Vocational Rehabilitation
Engineer, Civil
Engineer, Mechanical
Nurse, Professional
Occupational Therapist
Pharmacist
Physical Therapist
Teacher, Elementary School
Teacher, Secondary School

Level 3 (N=15)

Accountant, Cost
Claim Adjuster
Claim Examiner
Commercial Artist, Illustrating
Dietitian
Draftsman, Architectural
Engineer, Time Study
Librarian
Medical Technologist
Radiologic Technologist
Salesman, Automobile
Salesman, Real Estate
Salesman, Securities
Statistician, Applied
Teller (Banking)

Level 4 (N=32)

Accounting Clerk, Civil Service
Accounting Clerk, Manufacturing
Airplane Stewardess
Automobile-Body Repairman
Automobile Mechanic
Bartender
Beauty Operator
Carpenter
Cashier-Checker
Electrical Technician
Electrician
Electronics Mechanic
Embalmer
Landscape Gardener
Machinist
Maintenance Man, Factory or Mill
Nurse, Licensed Practical
Office-Machine Serviceman
Painter/Paperhanger
Photoengraver (Stripper)
Pipefitter
Plumber
Policeman
Programmer (Business, Engineering and Science)
Receptionist, Civil Service
Salesman-Driver
Salesperson, General (Department Store)
Salesperson, Shoe
Screw-Machine Operator, Production
Stenographer, Technical, Civil Service
Television Service-and-Repairman
Welder, Combination

-continued on next page-

Table 2, cont.

Level 5 (N=19)

Assembler (Electrical Equipment)
Assembler, Small Parts
Baker
Bus Driver
Clerk, General Office, Civil Service
Cook (Hotel-Restaurant)
Fire Fighter
Heavy Equipment Operator (Construction)
Marker
Meat Cutter
Nurse Aid
Orderly
Production Helper (Food)
Punch-Press Operator
Sewing-Machine Operator, Automatic
Sheet Metal Worker
Truck Driver
Typist, Civil Service
Waiter-Waitress

Level 6 (N=1)

Automobile Service Station Attendant

No Level Code

Engineer, Stationary
Instructor, Vocational School
Writer, Technical Publications

Table 3. Mean scale values on ORP dimensions for total group and 78 occupations classified according to Roe's level designation

ORP Scale	Total Group		Roe's Level Classification						
	Mean	S.D.	2	3	4	5 & 6	F[a]	p[b]	Omega-squared
Ability utilization	1.158	.440	1.578	1.389	1.176	.723	19.2	.00001	.41
Achievement	1.123	.296	1.396	1.260	1.130	.859	14.5	.00001	.34
Activity	.730	.301	.881	.597	.753	.711	2.1	.11	.04
Advancement	.605	.381	.665	.830	.602	.407	4.1	.01	.11
Authority	-.267	.378	-.009	-.132	-.315	-.435	4.3	.007	.11
Company policies	.761	.218	.684	.763	.744	.831	1.2	.312	.01
Compensation	.604	.418	.350	.696	.656	.592	1.8	.149	.03
Co-workers	.756	.168	.835	.733	.740	.755	1.0	.595	-.0005
Creativity	.609	.524	1.205	.865	.592	.117	21.0	.00001	.43
Independence	.491	.345	.461	.625	.548	.318	3.0	.036	.07
Moral Values	.691	.199	.838	.757	.632	.656	4.2	.009	.11
Recognition	.831	.211	.816	.941	.847	.733	3.1	.031	.08
Responsibility	.689	.496	1.219	1.019	.690	.148	31.4	.00001	.54
Security	1.223	.356	1.200	1.148	1.226	1.286	.4	.733	-.02
Social service	.949	.546	1.470	1.013	.878	.726	5.5	.002	.15
Social status	-.002	.319	.316	.123	-.029	-.225	10.7	.0001	.27
Supervision-human rel.	.681	.164	.606	.731	.691	.670	1.3	.273	.01

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Table 3, cont.

ORP Scale	Total Group Mean	Total Group S.D.	Roe's Level Classification 2	3	4	5 & 6	F[a]	p[b]	Omega-squared
Supervision-Technical	.624	.213	.392	.592	.667	.707	7.4	.0004	.20
Variety	.611	.349	.931	.629	.668	.333	10.5	.0001	.27
Working Conditions	.964	.220	.909	1.019	.960	.960	.5	.658	-.02
Autonomy	.684	.397	1.151	.966	.634	.297	29.9	.00001	.53
Unadjusted Neutral Point	-.664	.149	-.816	-.758	-.663	-.510	25.4	.00001	.48

[a]Value of the F-statistic with 3 and 74 degrees of freedom

[b]Probability of error in rejecting the null hypothesis of no differences in mean scale values between groups classified by Roe's levels.

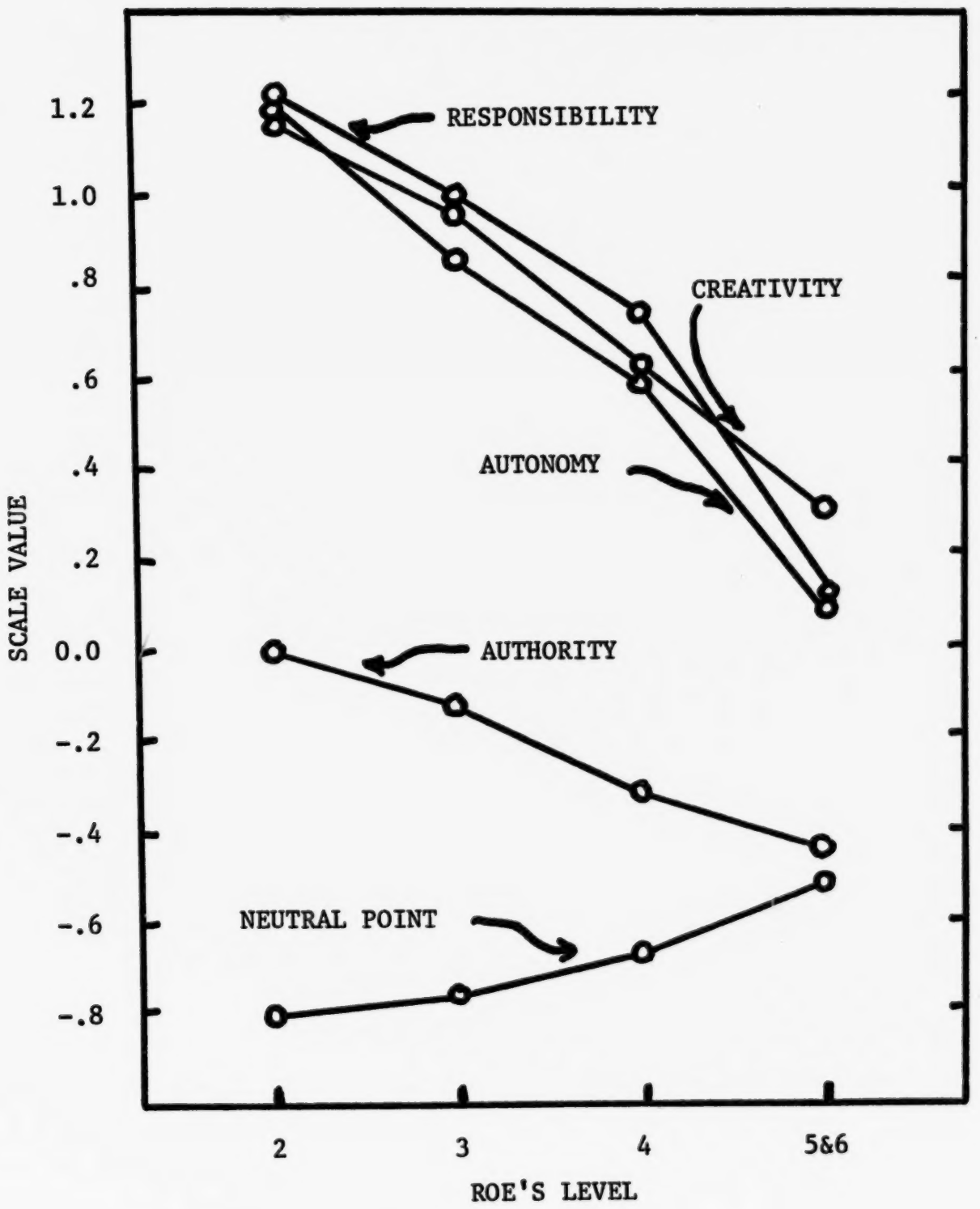

Figure 1

Relationship of Roe's Level Designation and ORP Dimensions of Responsibility, Autonomy, Creativity, Authority, and Neutral Point for 78 Occupations

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